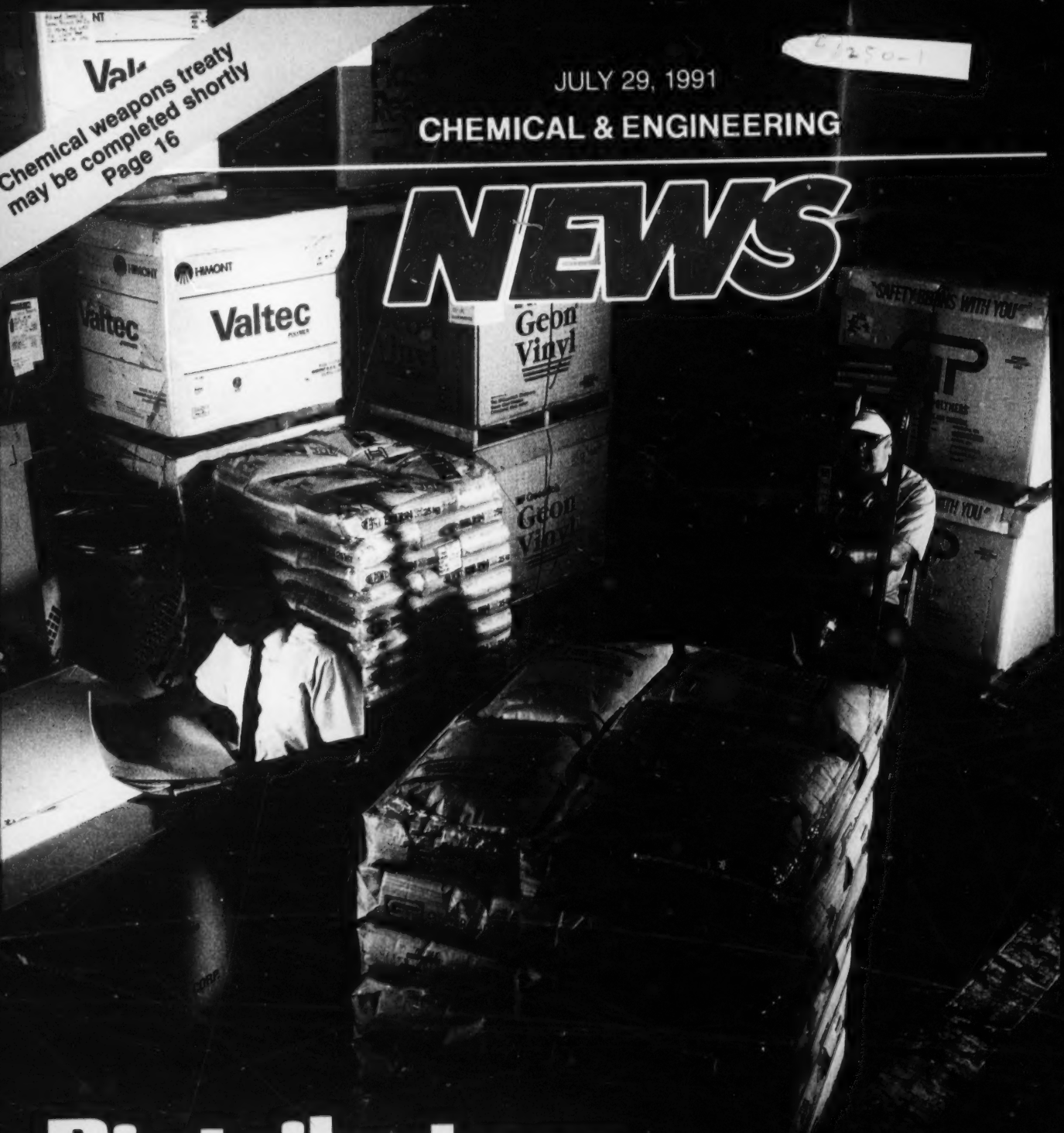
JULY 29, 1991
CHEMICAL & ENGINEERING

NEWS

Chemical weapons treaty may be completed shortly
Page 16



Distributors

A growing role in chemical industry
Page 25

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CHEMICAL & ENGINEERING NEWS

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News of the Week

■ **New NIH director Bernadine Healy outlines long-range strategic plan that would sharply boost the number of grants the agency awards.** Page 6

■ **Du Pont has launched a major program aimed at cutting annual costs by at least $1 billion over the next few years.** Page 7

■ **Tankcar derailment that poured 13,000 gal of soil sterilant metham-sodium into the Sacramento River likely will catalyze reform of safety regulations for rail shipment of toxic chemicals.** Page 7

■ **Chiron and Cetus will combine to form a major biopharmaceutical firm, to be called Chiron Corp., in biggest merger between two biotech companies to date.** Page 8

Cover: Employee at Ashland Chemical's general polymers facility in Columbus, Ohio, checks shipments of resins

Letters 4

Concentrates

Business 9
Government 15
Science/Technology 19

The Departments

New Products 35
Newscripts 76

Business

Mexican state-owned Pemex will need creative financing to support its ambitious petrochemical expansion plans. **Page 13**

Government

Optimism is high for a chemical weapons treaty in 1992 as the result of the President's recent pullback of two U.S. positions that had been big stumbling blocks in the negotiations. **Page 16**

Science/Technology

Water-displacing quinone-amine polymers that were little noticed for years are being looked at anew for coating uses. **Page 20**

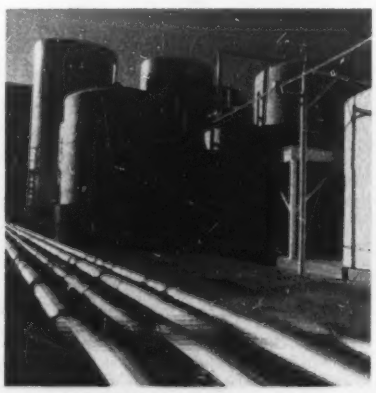
Nalco demonstrates its mobile lab designed for on-site water analysis, process simulation, and pilot testing. **Page 22**

ACS News

The new governing board for Chemical Abstracts Service and the background and reasoning behind its establishment are explained by ACS board chairman Joseph A. Dixon. **Page 45**

Meetings

Deadlines and topics for ACS meetings from spring 1992 in San Francisco through the year 2001 are listed. **Page 53**



Product Report

Role of chemical distributors is growing in response to industry pressure for extra services such as sales and technical expertise and additional safety and environmental responsibilities for shipments. **Page 25**

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LETTERS

CHEMICAL SAFETY

Explosion of CO absorbent solution

For monitoring carbon monoxide in lime kiln gas, a solution of cuprous chloride was prepared by dissolving 53 g of cupric chloride dihydrate ($CuCl_2 \cdot 2H_2O$) in 300 mL of concentrated hydrochloric acid. The solution thus prepared was allowed to stand over 75 g copper turnings in a stoppered bottle.

Over a period of several days, the initially observed dark solution became completely colorless. Over the following weeks, a very small quantity of colorless solid, presumably Cu_2Cl_2, was observed to crystallize gradually on the bottom. On vigorous shaking, the crystals resisted going back in solution, thus reflecting a degree of saturation of a highly insoluble chemical under the conditions.

After several months this mixture reportedly exploded one night. The explosion was not witnessed but heard as a pop or shattering of glass, and later contents of the bottle were observed on the floor of the storeroom where the bottle was initially placed on a shelf. A dense fog, typical of hydrogen chloride in damp air, was noticed a few minutes later, but no smell of chlorine was reported.

The unanticipated explosion of an aqueous Cu_2Cl_2 solution has left me puzzled. Some senior colleagues from the American Chemical Society also seem to have no explanation. I would therefore appreciate hearing readers' comments.

Ihsan U. Shah
Holly Sugar Corp.
Stockton, Calif.

Help for Romanian chemists

Having had recent personal contacts within academic circles in Romania, we wish to draw attention to the situation of Romanian chemists and chemical engineers. In addition to the political and economic difficulties confronting all Eastern European countries in their transition to market economy, Romania has to heal the wounds inflicted by 25 years of dictatorship by the Ceauşescus. For chemists, this means lack of documentation (books and journals—especially those published during the past 15 years—and access to data banks), computer hardware and software, and modern equipment such as spectrometers (FT-NMR, FTIR, x-ray diffractometers), reprographic equipment, telefax, and the like.

Western European countries, and, more recently, the U.S., have initiated valuable aid campaigns for orphans and handicapped persons, but little has been done for Romanian scientists and students. Although not handicapped physically, these individuals are at a serious disadvantage owing to the situation described above. Thus, chemists in universities and research institutes, 18 months after the Romanian revolution, still lack funds in convertible currency that would enable them to bridge this gap.

We wish to make western chemists aware that donations that would fill the gaps would be of enormous benefit to Romanian students, teaching staff, and researchers.

Interested individuals who wish to donate books, journals, computers, or equipment should contact a freight for-

Corrections

- June 3, page 12: In 1990, the estimated U.S. market for phosphates in the food industry was 320 million lb. The reported figure of 67 million lb is the amount of phosphorus used in producing derivatives for the U.S. food industry.
- July 8, page 15: Methylene chloride, not methyl chloride, is being replaced by *N*-methyl-2-pyrrolidone for such uses as paint stripping and metal degreasing.
- July 15, page 9: The crystal structure of the HIV regulatory protein Tat has not yet been solved; numerous research groups currently are working on this problem.

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Pemex's Petrochemical Expansion Will Require Creative Financing

Mexican state-owned firm is not allowed to form joint ventures with private firms but could offer product instead of equity to investors

Earl V. Anderson,
C&EN Northeast News Bureau

Pemex, says one observer of the Mexican petrochemical scene, has plenty of plans—but very little money. That's little different than any number of large petrochemical companies scattered throughout the world today.

But there is a difference. Pemex is Petróleos Mexicanos, the oil and petrochemical monopoly owned by the Mexican government. Under the Mexican constitution, only Pemex can produce oil, natural gas, and the "primary," or basic, petrochemicals that feed the downstream petrochemical plants in Mexico.

This means Pemex cannot court private companies, Mexican or foreign, with joint-venture proposals to help finance costly petrochemical projects. And financial institutions seem reluctant to make conventional loans to Pemex for its petrochemical operations.

It is not that Pemex—the company—is not creditworthy. Based on its oil operations, it is probably the most creditworthy company in Mexico. But petrochemicals are another story. Pemex has earned a poor reputation in its petrochemical operations, a reputation that it is working hard to correct. Meanwhile, taxes and social programs that Pemex's oil earnings support leave precious little money available for much-needed petrochemical investment.

"We have a serious financial problem," says Antonio Juarez Alvarado, petrochemical coordinator for Pemex's relatively new petrochemical division. Thus Pemex is looking at what Juarez calls novel financing arrangements to help build at least $1.5 billion worth of petrochemical plants in the very near future.

By novel, he means using money from private Mexican or foreign companies to help build the plants. These companies, however, get no equity in the plants. Instead, they are paid with product after the plant is built and put on stream.

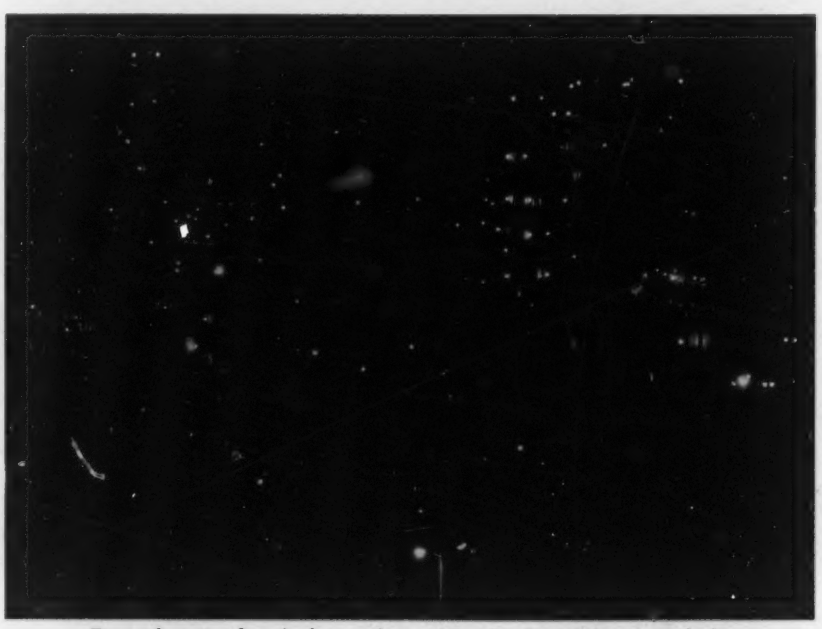
Pemex already has used this approach to finish two plants at its Morelos petrochemical complex that were running way behind schedule. Last year, Celulosa y Derivados S.A. (Cydsa) provided Pemex with about $10 million to finish its 50,000 metric-ton-per-year acrylonitrile plant at Morelos. The plant began operating early this year.

With its new Morelos unit, Pemex now has 180,000 metric tons of acrylonitrile capacity. With that, says Juarez, Pemex can supply the entire Mexican market and have some left over for export. Last year, the company produced 122,000 metric tons of acrylonitrile.

The same financing approach was also used to finish an acetaldehyde plant, also at Morelos. For this unit, about $15 million came from Celanese Mexicana, which will be repaid in product. This 150,000 metric-ton-per-year unit started up in December 1990.

Pemex, Juarez says, hopes to use this same novel financing scheme to help it build even more petrochemical plants. First, Pemex wants to finish its much-delayed propylene plant at Morelos.

Earlier this year, the company started operating the country's first polypropylene plant—a 100,000 met-



Pemex's petrochemical complex at Morelos is nearing completion

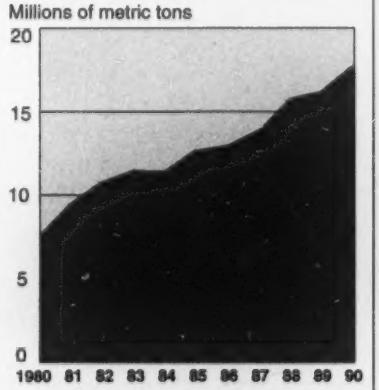
ric-ton-per-year unit—at Morelos. But, until last year, Pemex had been importing between 13,000 and 20,000 metric tons of propylene every year. That's why finishing the 350,000 metric ton propylene unit at Morelos is so important. Juarez says that it will be finished by the end of next year, at a cost of about $100 million.

Also high on the priority list is an aromatics train, which Pemex plans to build at its Cadereyta refinery. This will be a huge project. Minimum annual capacities include 140,000 metric tons of benzene, 400,000 metric tons of *p*-xylene, 18,500 metric tons of toluene, 54,000 metric tons of mixed xylenes, and 41,000 metric tons of *o*-xylene. Adding in the auxiliary units that accompany an aromatics complex means Pemex probably is looking at a minimum investment of $600 million.

Another high-priority, and high-priced, project Pemex is considering is an additional ethylene plant. The plant, which the company plans to build in the state of Tabasco, will have a capacity of 500,000 metric tons per year and will cost an estimated $450 million, says Juarez.

Also under consideration is a methyl *tert*-butyl ether (MTBE) plant. Pemex had considered several options, including several small MTBE units, and perhaps a TAME (*tert*-amyl methyl ether) unit. Now the company is leaning toward one large MTBE plant that also would be built in the state of Tabasco and cost about $350 million.

Pemex's petrochemical output keeps climbing



Source: Pemex (Petróleos Mexicanos)

Output soars for most key chemicals in 10 years

Thousands of metric tons	Pemex production 1980	1990
Acetaldehyde	48	190
Acrylonitrile	54	122
Ammonia	1883	2632
Benzene	79	320
Butadiene	17	21
Carbon black	na	252
Cumene	0	53
Cyclohexane	40	75
Dichloroethane	106	394
Dodecylbenzene	55	117
Ethylbenzene	29	192
Ethylene	366	1370
Ethylene oxide	30	265
Methanol	174	210
Perchloroethane	0	12
Polyethylene, high density	67	176
Polyethylene, low density	91	348
Propylene	137	363
Propylene tetramer	36	98
Styrene	31	158
Toluene	125	368
Vinyl chloride	62	231
Xylene, mixed	77	404
o-Xylene	16	75
p-Xylene	39	226

na = not available. Source: Pemex (Petróleos Mexicanos)

In addition, it is considering a 60,000 metric-ton-per-year MTBE plant at Morelos, which Pemex "may try to build soon," says Juarez. Feedstock isobutylene already is available at Morelos, he notes.

Nobody questions the need for these projects. For instance, Pemex stopped importing huge volumes of *p*-xylene in 1987. But secondary petrochemical companies in Mexico—the companies that are Pemex's customers—imported almost 122,000 metric tons of the material last year. There are many similar examples.

What experts on the Mexican petrochemical industry do question is Pemex's ability to attract outside capital to finance these projects. They concede, however, that Pemex was able to do so for its acetaldehyde and acrylonitrile plants at Morelos.

But the money involved, says one former Pemex petrochemical official, was "small potatoes." For the projects that Pemex hopes to build, he adds, the costs jump "into the hundreds of millions [of dollars]."

Few outside Pemex believe that many Mexican—or foreign—companies will be interested in financing Pemex's huge petrochemical projects with repayment coming only as product. Pemex has had negotiations along these lines with, among others, Japanese, U.S., and European firms.

Nothing, however, has materialized yet. Some think nothing ever will. Nevertheless, Juarez says Pemex is "very close" to reaching a financing agreement for the aromatics project with a French company. And it is talking with other European companies about financing the ethylene plant.

Most observers agree that potential investors would be interested in financing the Pemex projects only if they received equity in the projects. Under current Mexican law, this is impossible.

What may be possible is that the "rules" of the petrochemical game in Mexico could be changed. Over the years, the long list of "primary" petrochemicals that were reserved solely for Pemex has been pared to only 19 products. The most recent to be removed and placed on the "secondary" petrochemical list was MTBE. Foreign companies can own up to 40% of operations producing products on this list (and, in some special cases, 100%).

Merely thinking along these lines will not make it happen. But even its detractors concede that Pemex is changing for the better, as far as petrochemicals are concerned.

Last year, it created a separate petrochemical division to give petrochemicals more autonomy. Both Pemex and the country are committed to an open, market-oriented economy. The free trade talks with the U.S. and Canada testify to that. And there's almost universal agreement that Mexico needs foreign petrochemical investment.

Juarez says that Pemex is working hard to become a "world class" petrochemical company. It's a slow, difficult process because it means changing a philosophy that's deeply entrenched within the company. But, he adds, "we think we are starting to make our point." □